

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC. 20554**

<b>In the Matter of</b>	)	
	)	
<b>Amendment of the Commission's</b>	)	<b>RM-10868</b>
<b>Rules Governing the Amateur</b>	)	
<b>Radio Service to Implement</b>	)	
<b>Changes to Article 25 of the</b>	)	
<b>International Radio Regulations</b>	)	
<b>Adopted at the 2003 World Radio-</b>	)	
<b>communication Conference, to</b>	)	
<b>Enhance the Amateur Radio</b>	)	
<b>Service and to Fulfill the</b>	)	
<b>Commission's Objective of</b>	)	
<b>Streamlining the Amateur Radio</b>	)	
<b>Service as Set Forth in WT</b>	)	
<b>Docket 98-143</b>	)	

**To: The Commission**

The following is a set of comments from Nickolaus E. Leggett, an amateur radio Extra Class operator, inventor (U.S. Patents 3,280,929 and 3,280,930 as well as an electronics invention patent application pending), and a certified electronics technician.

My comments are on the petition on the restructuring of amateur radio licenses submitted to the Commission by the Radio Amateur Foundation. This petition has many sound comments about the amateur radio service and its licensing system.

**Morse Code and Electromagnetic Pulse (EMP)**

I note with interest that the petition describes the role of Morse code operation in the aftermath of a nuclear (and/or electromagnetic pulse) attack. In this discussion, the petitioners state that:

“It is common knowledge in technical circles that in the event of even a limited nuclear attack, modern terrestrial, satellite, and emergency backup communications

networks will be, for the most part, rendered useless by the electromagnetic pulse (EMP) event generated by the nuclear explosion(s).” [Paragraph 23 of the petition]

This is of interest because Donald J. Schellhardt and myself submitted two petitions (RM-5528 and RM-10330) to the Commission calling for action to protect communications systems from EMP. The Commission did not act favorably on these petitions, but the fact of electromagnetic pulse effects remains as a threat to communications system integrity. This threat is increased by the heightened vulnerability of modern integrated circuits and wireless technologies to EMP effects.

Morse code operations conducted by radio amateurs could be extremely useful in an EMP event. Suitably trained amateurs can improvise basic Morse code communications systems from salvaged electronics equipment. These Morse code transmitters would be simple “radio lightbulbs” consisting of a circuit using a single transistor turned on and off to transmit the characters of a Morse code message.

In our ongoing and long-term war on terrorism, it is likely that an EMP event will occur. In addition, hostile parties can use high power microwave (HPM) devices to inflict damage over smaller areas as well.

In this regard, refer to my comments on the petition concerning Morse code and amateur radio filed by Mr. Ronald D. Lowrance, K4SX (listed below in **Appendix A** of this document). This EMP consideration is one of several reasons to support some continued testing for Morse code knowledge.

A new reason for Morse code is that it will be useful in fringe areas near to Broadband over Power Lines (BPL) Internet service areas. Morse code will help to send amateur radio messages through the BPL interference. Of course Morse code will not be

able to overcome the intense radio frequency interference that can occur directly within BPL service areas.

Additional reasons for Morse code are listed in **Appendix B** of this document.

### **Wide Digital Subband**

The petitioners propose that a subband of frequencies be authorized on 29.0 through 29.3 MHz for wideband digital experimentation as well as more conventional amateur radio operation (Paragraph 34 of the petition). Digital transmissions up to 15 KHz in bandwidth would be allowed on this subband.

This is a valuable idea. This would be experimenters' subband where long distance and international communication using new digital modes would be conducted. This could include digital voice experiments and activity with new inventive homebuilt versions of software defined radios. The proposed standard of 15 KHz would accommodate the operation of experimental digital prototypes that would later be developed to transmit narrower emissions.

In addition to being directly valuable, this subband would communicate the value that the amateur radio service has a strong technical and inventive component that earns respect and radio allocations. This subband will encourage the excitement of digital home-built equipment and experimentation.

### **Criticism of Current Testing Techniques**

The petition criticizes the current practice of publishing all of the questions asked on FCC amateur radio examinations. The petitioners argue that such question pools encourage memorization instead of understanding of the material.

This criticism is correct from an educational standpoint. It should be noted that the information technology (IT) certification examinations are moving away from material that could be memorized to exams that are based on the analysis of scenarios (situations).

The Commission should set up a panel of educational experts to evaluate this important issue for both amateur and commercial radio operator examinations.

**Respectfully submitted,**

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**April 2, 2004**

## **Appendix A**

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC. 20554**

<b>In the Matter of</b>	)	
	)	
<b>Changes in Part 97</b>	)	<b>RM-10869</b>
<b>With Regard to Amateur Radio</b>	)	
<b>Services Rules, Element 1</b>	)	
	)	

**To: The Commission**

**COMMENTS of Nickolaus E. Leggett  
N3NL Amateur Radio Operator**

The following is a set of comments from Nickolaus E. Leggett, an amateur radio operator. My comments are on the petition concerning Morse code and amateur radio filed by Mr. Ronald D. Lowrance, K4SX.

### **Morse Code and Homeland Security**

Mr. Lowrance makes the point that Morse code operations can be quite useful in a high-intensity emergency where normal communications systems have been disabled. This capability of Morse code is especially appropriate for homeland security situations where hostile persons have sabotaged our high-technology communications systems.

## **Long Duration Intense Emergencies**

One such situation is where Electromagnetic Pulse (EMP) is used to disable communications systems over a wide geographic area. In this situation, knowledgeable amateur radio operators can improvise Morse code communications systems using salvaged electronics components. Improvising Morse code transmitters is facilitated by the fact that Morse code is a simple on and off code. Thus the amateurs only have to build simple oscillator transmitters (“radio lightbulbs”) that can be rapidly turned on and off to send messages by Morse code. Such transmitters can consist of a single transistor or vacuum tube and its associated resonant circuit components.

In such a long-duration emergency, one does not care about the quality of the signal transmitted as long as the receiving operator can understand it. As a result, very basic transmitter circuits can be used without any filtering. These transmitters would be like the simple breadboard transmitters that amateur radio operators built in the 1930s. Indeed, even improvised spark-gap transmitters would be useful in some circumstances.

## **Required Amateur Skills for Long Duration Emergencies**

Amateur radio operators must be skilled in electronics and in Morse code to provide this service of building communications systems out of scrap parts. Having some type of Morse code examination for amateur radio licenses encourages operators to learn the skill. In addition, knowing Morse code allows one to participate in the design, construction, and testing of simple low-power (QRP) Morse code transmitters and receivers. This is essentially a training ground for future situations where communications must be improvised on site.

Some observers have claimed that the need to improvise communications will never occur. Their claim is highly unlikely in the long-term war on terrorism. In this regard it is interesting to note a report on C-Span that terrorist groups are recruiting graduate electronics engineers. Such recruits would probably invent nasty surprises that would require hams and others to improvise communications devices on the spot.

**Recommended Action**

The Commission should retain a Morse code testing requirement at least for the Extra Class license exam. I don't know that I would go as far as Mr. Lowrance suggests in re-establishing Morse code. But I would keep a role for Morse code in amateur radio licensing.

**Respectfully submitted,**

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**March 31, 2004**

## **Appendix B**

### **Reasons for a Continued Role for Morse Code**

There are several reasons why the retention of some role for Morse Code in amateur radio serves the national interest and enhances the public service roles of amateur radio:

Morse Code equipment is more affordable for amateur radio operators in third-world nations than voice mode (single side band) amateur radio equipment is. Robust Morse Code operations by Americans encourage these operators to participate in world-wide amateur radio.

Morse Code with the standard Q signals can be understood by operators who speak different languages. This enhances international amateur radio communications.

American amateur radio operators of limited means can afford to build or purchase low-power Morse Code equipment for the fairly low price of \$100 to \$200 as compared to the much higher prices for single side band amateur radio equipment.

Morse Code is inherently narrow-band in nature allowing numerous amateur radio stations to share a given allocated band of frequencies.

Morse Code stations are quite simple, encouraging amateur operators to get involved in analyzing, designing, and building their own equipment as well as modifying existing equipment.

Morse Code is effective at low power levels allowing greater frequency reuse. I have operated on the high frequencies using one Watt of output power and Morse Code.

Morse Code is valuable during megadisasters or other extreme conditions when amateur operators must improvise their own transmitting equipment. Attorney Donald J. Schellhardt in comments in docket RM-10412 first introduced the concept of a megadisaster. Schellhardt defines a megadisaster as "A life-threatening disaster, either natural or man-made, of sufficient intensity and scale that it: (a) destroys and/or disables much, most, or all of the basic infrastructure and services over an area of at least 10,000 square miles, for a period of at least weeks or months; and (b) prevents or significantly restricts the flow of relief supplies and personnel, from areas which are not directly affected, for a period of at least two weeks." (Comments of April 21, 2002). In a megadisaster, the operator can easily be isolated on his own and have to improvise radio communications. In such a situation it is much easier to create a keyed radio oscillator or even a keyed radio noise source than it is to create a single side band or FM transmitter. In addition, Morse Code can be used with a light, whistle, or car horn to provide local communications.